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Case Report

Post-traumatic lethal carotid-cavernous fistula

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Abstract

The authors report about an unexpected death by traumatic lesion of the internal carotid artery in a 30-year-old man who had fallen two metres. The man suffered a fracture of the left maxillary sinus and a fracture of the right orbit with bilateral haemorrhage of the maxillary sinus. Surgical treatment was performed with favorable outcome. Clinically, there were no neurological symptoms but about 60 days after his accident, the man died from uncontrolled epistaxis. He was submitted to the autopsy that show a linear fracture in the left side of the turcic sella and lesion of the left internal carotid artery with carotid-cavernous fistula.

Keywords: Trauma; Arterial dissection; Carotid-cavernous fistula; Unexpected death

1. Introduction

The internal carotid artery may be injured at anywhere tract of its course from the common carotid origin, to the cavernous sinus.[1–5]

Most of the injuries are related to both open and blunt traumas of the head or the neck and lead to massive hemorrhagic infarction of the corresponding cerebral hemisphere. Rupture of the artery can also happen after a variable period of time (a few days or a few years) from the trauma because of a rupture of a post-traumatic aneurysm.[6]

Post-traumatic carotid-cavernous fistula is a rare and often lethal complication of head trauma and very few cases are reported with a detailed anatomical and histological description of the post-mortem picture.[7–10]

In this contribute the authors describe the clinical events leading to a sudden death, and the pathology of the post-mortem findings, caused by a post-traumatic carotid-cavernous fistula in a 30-years old white man.

2. Case report

A 30-year-old man fell down from a ladder two metres high from the ground. He had cranial-facial trauma and thoracic trauma. No neurological abnormalities, apart a short-time post-traumatic amnesia, had been founded. CT scan showed a fracture of the left maxillary sinus, a linear fracture at the floor of the right orbital cavity and bilateral hemosinus. Further checks showed also the fracture of the sixth and seventh rib on the left side. The patient underwent surgical reconstruction of the fractures of facial bones. The postoperative course was regular so that three days later the patient was discharged from the hospital. The patient had no local complication after surgery and his healthy has been reported like "good healthy" by his relatives, but after 60 days the man had a severe bilateral

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epistaxis, left exophthalmoses and chemosis of conjunctiva. When he arrived to the hospital he was unconscious but died after a short period.

The legal authorities ordered the autopsy.

3. Autopsy and histological findings

Autopsy and external examinations were performed at the Institute of Legal Medicine in Palermo. The external examination showed copious nasal haemorrhage; bilateral periorbital haematoma and left exophthalmos. The autopsy revealed oedema of the brain and a congestion of the brain veins. The removed pituitary gland allowed to expose the "sella turcica", where a linear fracture on the left side has been founded. The examination of left internal carotid artery running into the cavernous sinus revealed a lesion of the artery with carotid-cavernous fistula.

Both left and right common carotid arteries were undamaged. There were no lesions in the scalp and in the galea capitis and no intra-cerebral haemorrhage was found (Fig. 1). The other findings of the autopsy were irrelevant to determine the cause of death. The blood alcohol and toxicological screening were negative.

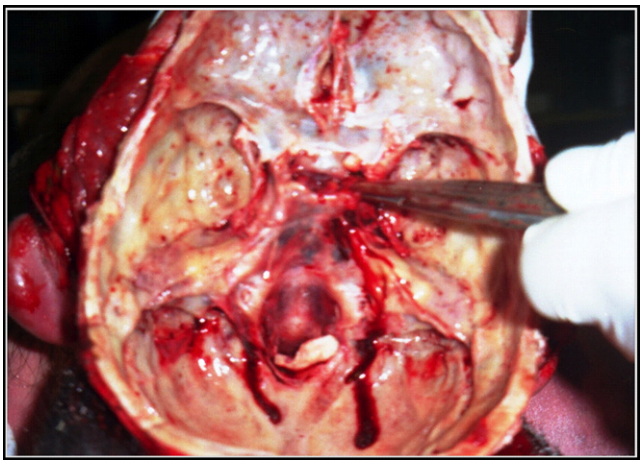

Fig. 1. Sella turcica (the pituitary gland has been removed).

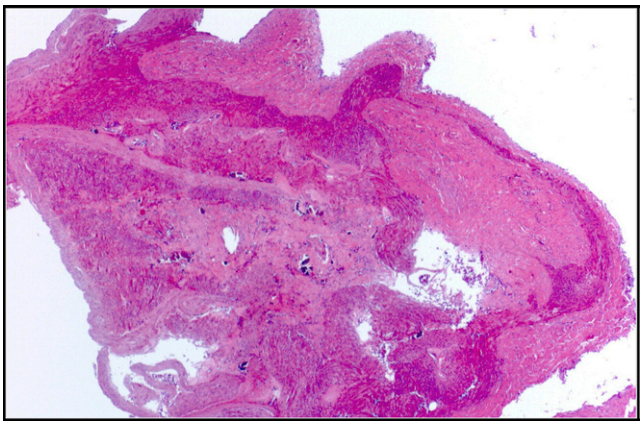

Fig. 2. Histological examination showed a carotid-cavernous fistula with direct communication between internal carotid artery and cavernous sinus (HE X25).

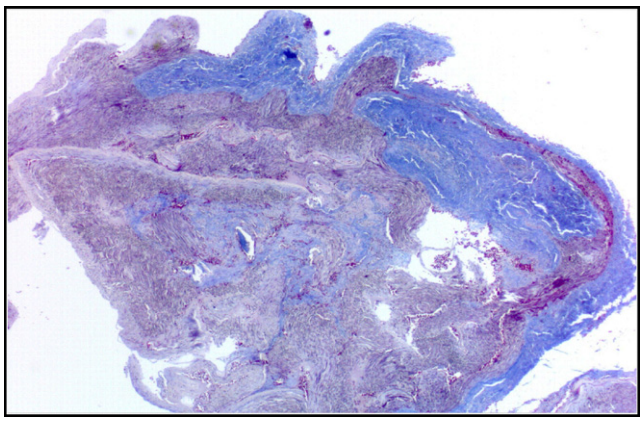

Fig. 3. The disruption of the wall of the internal carotid artery. There were multiple calcifications. Masson Trichrome stain (X25).

Fig. 4. No haemosiderin deposits were detected by Perl's–Van Gieson stain in the point of rupture and near it, ruling out any prior bleeding (16× Perl's–Van Gieson stain).

Fig. 5. No haemosiderin deposits were detected by Perl's–Van Gieson stain in the point of rupture and near it, ruling out any prior bleeding (40× Perl's–Van Gieson stain).

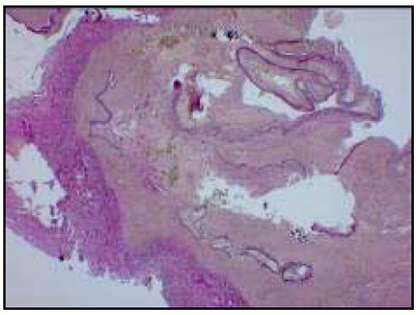

Fig. 6. Weigert–Van Gieson stain showed discontinuous elastic fibers, focal thinning of medial muscle and thickening of the adventitia by dense collagen (40× Weigert–Van Gieson stain).

Fig. 7. Weigert–Van Gieson stain showed discontinuous elastic fibers, focal thinning of medial muscle and thickening of the adventitia by dense collagen (16× Weigert–Van Gieson stain).

The microscopic examination of the internal carotid artery showed a direct communication between the internal carotid artery and cavernous sinus with intimal fibrosis and calcification. Intramural haemorrhage, calcification and fibrosis of the vessel's wall were clearly showed too (Figs. 2–7).

4. Discussion and conclusions

We believe that the case reported is worth mentioning because the carotid-cavernous fistula is a rare, but very severe, complication after head and facial trauma.

The long span of time between the accident at work, apparently resolved with a surgical procedure routinely performed, and the death, after a sudden worsening of clinical conditions with the typical and, in the same time, dramatic picture of the carotid-cavernous fistula, are also particularly interesting.

The assessment of the causal link between the facial trauma and the vascular pathology is the first point to address as death followed the trauma after 60 days. Symptoms were severe (massive epistaxis) and they were compatible with the carotid-cavernous fistula formation. Other cases reported in literature (2–4) confirm that it takes a variable period of time (varying from a few days to a few months) for the formation of a fistula of this kind. The sudden onset of the clinical picture leading to, almost immediate, death and the absence of any symptom after the surgical procedure (as referred by the man's relatives), exclude any profile of medical liability.

The genesis of the carotid-cavernous fistula is compatible with the trauma and with the compound fracture of the skull base, despite not being evidenced by CT scan at the time of the trauma, but founded during autopsy.

The features of the cranial base fracture allowed us to exclude a force pressure in the vessel wall. The presence of a fibrosis, associated with a calcification process, proves healing phenomena that followed the original vessel lesion. It is also very likely a subsequent wall fissuration starting from the vessel intima. Both the vascular lesion and the cranial base fracture can be compatible with the trauma suffered by the young man.

The technical approach, during autopsy is of use, at the internal carotid artery when it runs into the cavernous sinus is of interest. After the pituitary gland has been removed, the media and superior walls of the sinus can be removed using bone forceps and soft tissue dissection to expose the internal carotid artery. The artery enters the cavernous sinus posteriorly from the carotid canal and then arches anteriorly before it turns upwards and enters the subarachnoid space adjacent to the optic nerve.[11] The incision with the scalpel of dura mater allows a good exposition of the internal carotid at this level.

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